Small Business Innovation Research/Small Business Tech Transfer

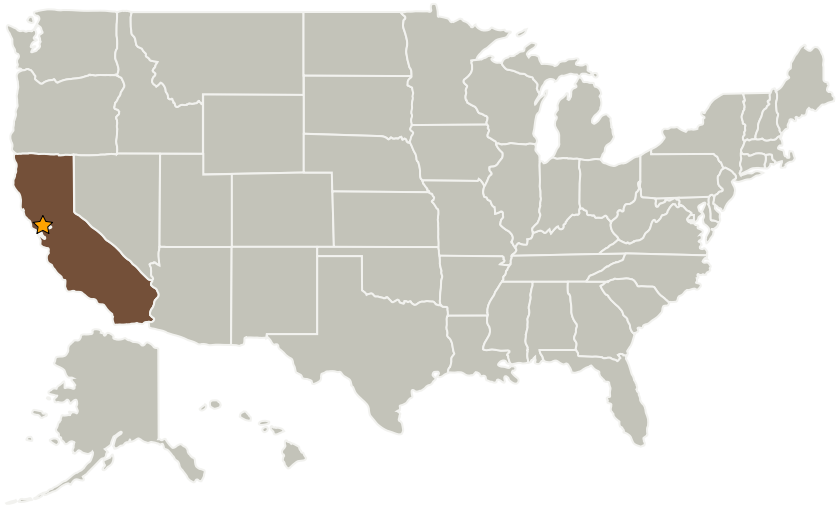
Heatshield Ablation Pattern Roughness Onset and Effects, Phase I

Completed Technology Project (2009 - 2009)

Project Introduction

This project will develop a practical method for predicting pattern roughness onset and quantitative effects on heat and mass transfer rates for heatshield materials such as Phenolic Impregnated Carbon Ablator (PICA) and environments such as those anticipated for the Crew Exploration Vehicle (CEV). Surface roughness patterns (e.g., scallops, crosshatching) form on many materials ablating under turbulent flow conditions. Equivalent sand grain roughness models are inaccurate and inappropriate for calculating Stanton numbers. In Phase I, we will develop a near-term method based on pattern roughness data, observations, and models from diverse fields. This method may predict Stanton number increases directly from material and aerothermal environment information instead of sequentially predicting pattern dimensions, equivalent roughness height, and Stanton number effects. We will also plan a more rigorous longer-term model and validation tests to be implemented in Phase II.

Primary U.S. Work Locations and Key Partners



Organizations Performing Work	Role	Type	Location
★Ames Research Center(ARC)	Lead Organization	NASA Center	Moffett Field, California
St. Croix Research	Supporting Organization	Industry	San Jose, California

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Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Center / Facility:

Ames Research Center (ARC)

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

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Primary U.S. Work Locations
California

Project Management

Program Director:

Jason L Kessler

Program Manager:

Carlos Torrez

Technology Areas

Primary:

- TX09 Entry, Descent, and Landing
  - TX09.4 Vehicle Systems
    - TX09.4.5 Modeling and Simulation for EDL